Fish Resources Conservation by Traditional Fishermen in West Java, Indonesia

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Abstract

Increase of fishing activities in Indonesian waters tends to lead in overfishing. Conservation efforts are needed to save the sustainability of fish resources. Fishermen who directly related to the sea have an important role in the implementation of fish resources conservation. This article is aimed to analyze the implementation level of the conservation of fish resources done by the fishermen; which further separated in the category of fish resources protection activities; preservation of fish resources, and sustainable utilization of fish resources. The design of the study is explanatory research using a quantitative approach. The population were traditional fishermen in the Palabuhanratu Village, District of Palabuhanratu, Sukabumi, West Java, Indonesia. Respondents of 75 people were chosen randomly from total of 3,900 people in such village. Data were collected using survey method, and presented in the form of frequency tables and descriptions, and analyzed descriptively. The results indicated that the level of protection of fish resources was in the moderate category; the fishermen have had efforts to protect fish resources although the implementation was not optimum. The level of conservation of fish resources was categorized as high, e.g. traditional fishermen have understood well that the fish resources need to be conserved properly to keep the fish resources can be harvested in a long time. Also, the level of sustainable utilization of fish resource was categorized as high, as confirmed by the absence of fishermen who use environmental-destructive fishing gear.

Keywords: conservation of fish resources, traditional fishermen, protection of fish resources, preservation of fish resources, sustainable utilization of fish resources.

INTRODUCTION

Increasing in fish consumption in Indonesia has stimulate fishing activities in the sea, in fact even some fishing areas in Indonesia has had overfishing. Its's estimated that fish resources utilization in Indonesia have been reached 60%. The potential of fish resources in Indonesia waters is estimated at 6.19 million tons with overall utilization rate has reached 62% (Pasaribu, 2009). As a result, a large number of species in the ocean is fast disappearing, even some of them have become extinct because fishing activities, habitat destruction, and the negative impact from predators and competitors. To minimize overfishing and extinction of species, there's a need for conservation efforts, in order that fish resources still available and useful in the long time.

Conservation of fish resources and the application procedure has been formulated by Indonesian government in the Government Law no 31 2004 on Fisheries, and Government Regulation no 60 2007 on Fish Resources Conservation. According to both regulations, fish resources conservation is defined as the protection, preservation, and utilization of fish resources,

including ecosystems, species, and genetic to ensure the existence, availability, and continuity while maintaining and improving quality and diversity of fish resources. Referring to the definition of fish resources conservation, the conservation efforts should carried out through three activities: a) protection of fish resources, b) preservation of fish resources, and c) the sustainable utilization of fish resources.

Conservation activities are a shared responsibility between the government and the public. Fishermen as directly related to the sea should be involved intensively because fishermen is spearheading the successful implementation of conservation. However, the involvement of coastal communities in the implementation of the conservation of fish resources is still low (Winata and Yuliana, 2010). Nikijuluw (2002) argues that local communities should be more involved in a marine resource management programs. The involvement is a provision of the responsibility to the community, so that they can make decisions that affect their welfare.

Traditional fishermen who are associated directly with the sea need to apply the principles of conservation. Therefore, this article describes the efforts to apply conservation activities by traditional fishermen. The purpose of this article is to analyze the level of the conservation implementation of fish resources, including protection activities; preservation, and sustainable utilization of fish resources.

METHODS

The design of the study is explanatory research using a quantitative approach. The population surveyed were traditional fishermen in the Palabuhanratu Village, District of Palabuhanratu, Sukabumi, West Java, Indonesia. Respondents of 75 people were chosen randomly from total of 3,900 people in such village. Selection of study sites was based on the consideration that the location is the largest fishing centers in the province of West Java, while fishermen in such site are come from various regions in Java. So, Palabuhanratu is the largest fishermen village in West Java.

The data collected is the primary data. Data were collected using survey method, by giving questionnaires to fishermen and reinforced with interview. Primary data obtained by field surveys are presented in the form of frequency tables and descriptions, and hence analyzed descriptively.

RESULTS AND DISCUSSIONS

Description of Respondents

Most of respondents included are in early adult (31-40 years) and middle adult (41-50 years). Human in such age group are categorized as the productive age. According Kurnianingtyas (2009), human in the middle adult usually concentrate on work status and have good responsibility. The middle age adults is the ideal age group for fishermen, because fishing is a heavy duty that requires a strong force. Besides, they also have a lot of experience in fishing, because in common they had practice working in fishing vessels since they were young.

As many as 84% of respondents have a low level of education (elementary school). Such finding is agree with Pakpahan *et.al.* (2006) opinion, that the fishermen community usually have a low education. Fishermen rarely have a formal education for their profession, nonetheless they have only fishing experience that has been undergo since a young age. However, the low level education does not obstruct traditional fishermen to learn conservation sciences for improving their activities on fish resources conservation.

In economical aspect, most of respondents (83%) had a moderate level of income (1-2 million rupiahs, ca. 103-206 USD a month). It categorized as moderate especially when compared to the level of income in other fishing grounds, which are at lower level in average. The number of family dependents for most of the fishermen is more than 3 people. From the

reality that their average income of 1-2 million rupiahs are spent for supporting more than 3 people of family members, it can be estimated that the quality of life of fishermen families are still in the lowest level.

Implementation Level of Fish Resources Conservation

Protection of Fish Resources

Efforts to protect the fish resources were measured from three indicators, i.e: respondents do not focusing to catch only on one certain species of fish; respondesnt do not catch immature fish; and respondents do not catch protected species of fish. But, for the sake of instrument reliability, questions asked to respondents on the questionnaire were in positive sentences. The results are presented in Table 1.

Table 1. Respondents efforts in protecting fish resources

No.	Implementation of Fish Resources Protection	Frequency	Percentage (%)
1	Respondents catch only one certain species of fish		
	a. Yes	24	32
	b. No	51	68
	Total	75	100
2	Respondents catch immature fish		
	a. Yes	36	48
	b. No	37	52
	Total	75	100
3	Respondents catch protected fish species		
	a. Yes	7	9.3
	b. No	66	90.7
	Total	75	100

Based on the data in Table 1, it was found that the respondents (68%) did not focusing catch only on one certain species of fish; fishermen (52%) did not catch immature fish; and fishermen (90.7%) did not catch protected fish species. Average of fishermen who implement fish resource protection efforts were above 50%.

Catching on only one certain species of fish will lead to species extinction in a short time, if not accompanied with stock recovery efforts. Therefore, fishermen should avoid focusing catching activities on one certain species of fish. According to the data in Table 1, there were 32% respondents who catching one certain fish species due to the limitations of fishing gear. But, they do not intend to hunt only one species of fish.

Some fishing gears owned by fishermen are designed to catch specially only one species of fish, such as shrimp nets and longlines to beltfish (*Trichiurus* spp.). Such fishing gears can not be use to catch another kind of fish. In addition, often fishermen are joint to certain fishing gear community, so they do not have another option to catch the fish except using the fishing gear specified. For example, fishermen who are members of beltfish fishing gear community will always catch beltfish and not have choices to catch another fish. Thus, fishermen catch one certain species of fish is generally caused by limitations on fishing gear they operate, and not because of their intention to hunt only one species of fish.

In conducting the fishing activities, there are some fishermen who use fishing gear for catching smaller fish. As many as 48% of respondents say that their fishing gear can be used to catch immature fish. The respondent do not understand that the immature fish is prohibited to catch for the protection of fish resources.

Even in coastal area in and around Palabuhanratu, coastal community still have a local culture to catch "*impun* fish" in certain times. "*Impun* fish" are small, juvenile fish consist of several unidentified species that arise periodically due to moon cycle, especially during several nights before full moon. Local people collect *impun* fish in early morning, for their own food or to be peddled to tourists at the beach of Palabuhanratu. If such practice continues, there's a worry that such certain fish will extinct at least locally. The above case is a good, clear example that fishing activities often conflicting with the resources conservation goals (Radarwati *et al.*, 2010).

Supposedly, people's interactions (including fishermen) with natural resources is always based on values, norms, and customs (local wisdom). Local wisdom has an important role in the management of natural resources, human, and social (Mulyadi *et al*., 2009). It is expected, that the fishermen local wisdom can support conservation or preservation of marine resources.

In general, fishermen know the protected fish species that prohihibited to catch, due to it's conservation status. It is conform with Winata and Yuliana (2010), that the coastal communities of Palabuhanratu know well of protected fish species, such as sea turtles and dolphins. They also know that those species should not be captured or processed or traded. Along with fishing activities, as many as 90.7% of respondents had never caught a protected fish species. According to local story of fishermen in Palabuhanratu, dolphin is considered as the reincarnation of a princess, and if any fishermen dare to catch the dolphins, he will be exposed to revenge. Many fishermen believe that, so if they accidentally catch dolphins, the animal will be released back into the sea. According to Mulyadi *et al*. (2009), such kind of local belief is categorized as local wisdom which very helpful in the fish resources conservation. In addition, there are quite large fines imposed on catching the protected fish, so that the fishermen will not catch the fish for avoiding penalized.

Based on the above findings, the protection level of fish resources are determined using the scores, as presented in Table 2.

Table 2. The protection level of fish resources

The Protection Level	Indicators	Frequency	Percentage (%)
Low (Score: 3-5)	Fishermen catch only one certain species of fish; use fishing gear that could catch immature fish; and catch protected fish species	16	21.3
Medium (Score: 6-8)	Fishermen catch only one certain species of fish; use fishing gear that could catch immature fish; and do not catch protected fish species	49	65.3
High (Score: 9-11)	Fishermen not catch only one certain species of fish; use fishing gear that could catch immature fish; and do not catch protected fish species	10	13.3

The protection level of fish resources as shown in Table 2 indicate that the fishermen had been making efforts although its application has not been optimum yet. There's still required extension activities for providing further insight and awareness to the fishermen about the importance of protecting and conserving fish resources.

Conservation of Fish Resources

Conservation of fish resources is necessary to sustain fish production, today and in the future. Conservation efforts is needed to ensure the sustainability of fish habitat, i.e. in the spawning ground, nursery ground, feeding ground, and migratory route, both in freshwater, brackish water, and marine environment. Some ecosystems related to the fish resources conservation are the sea, seagrass, coral reefs, mangroves, estuaries, coastals, marshes, rivers, lakes, reservoirs, ponds, and artificial aquatic ecosystems. At the other levels, are conservation of genetic and species of fish, which also further needed to ensure fish diversity and sustainable fisheries management can be achieved. Respondents efforts in conservation of fish resources are presented in Table 3.

Table 3. Respondents efforts in conservation of fish resources

No.	Understanding of Respondents about Fish Resources Conservation	Frequency	Percentage (%)
1	Fish resources need to be conserved		
	a. Yes	70	93.3
	b. No	5	6.7
	Total	75	100
2	Marine environment need to be maintained		
	a. Yes	71	94.7
	b. No	4	5.3
	Total	75	100
3	Catched fish are decreased from year to year		
	a. Yes	52	69.3
	b. No	23	30.7
	Total	75	100

Based on Table 3, the results indicated that 93% respondents agreed that the fish resources need to be conserved for various reasons. Among such reasons, which are excerpted from questionnaires, are: to saving fish resources; continuation to catch fish; maintaining the beauty of the sea; inter-generation sustainability of fish resources. Such understanding is an important factor for respondents to be careful in catching fish. Respondents were aware enough that the sustainability of fish resources will affecting another ecosystems, as the sea is a unity.

Winata and Yuliana (2010) found that the fishermen efforts in fish resources conservation is determined by their knowledge and understanding of such concepts. Level of knowledge of resources conservation in coastal marine communities are very diverse. As many as 56% of the fishermen surveyed are considered know the meaning of the protection and conservation of marine resources (Winata and Yuliana, 2010). Fishermen also understand the meaning of the word "sustainability" even though, in practice, still need guidance in applying conservation of marine resources.

Table 3 also explain that 94.7% of respondents agreed that the marine environment need to be maintain to support fish life. It means, the respondents have good environmental awareness. Again from their questionnaires, such awareness also indicated by their participation in maintaining the cleanliness of the sea, especially from pollutants. The majority of respondents (69.3%) also aware that the catch has declined from year to year. It means, the respondents actually have a concern on the catch results. However, they have a dillema between achieving a

significant number of catches due to increasing their revenue, and at the other side, their obligation to conserve the fish resources.

The level of understanding of the fishermen, now is determined based on the scores that have been obtained from the respondents answers on the questionnaire, as described above. Such level of understanding on fish resources conservation are presented in Table 4.

Table 4. The level of understanding on fish resources conservation

Level of understanding	Indicators	Frequency	Percentage (%)
Low (Score: 1-7)	Respondents do not aware that fish resources need to be conserved; marine environment need to be maintained; nor they aware about decline on fish catches.	9	12.0
Medium (Score: 8-12)	Respondents understand that fish resources need to be conserved; but do not aware that the marine environment should be maintained; nor they aware about decline on fish catches.	29	38.7
High (Score: 13-16)	Respondents understand that fish resources need to be conserved; the marine environment should be maintained; and also aware about decline on fish catches.	37	49.3

According to Table 4, most (49.3%) of respondents have a high level of understanding. It means, the respondents have understood well that the fish resources need to be conserved properly to keep the fish resources can be utilized in a long time.

To be able to achieve the optimal goals in fish resources conservation, there are needs to improve efforts. An effective way to increase efforts towards fish resources sustainability need to be based on the fishermen convenience in accessing informations. Along with improvement of fishermen knowledge of resources sustainability, we could expect a step up in fishermen attitude dealing with resources conservation. As Nikijuluw (2002) said, a marine management program should involve local communities to get the better result.

Sustainable Utilization of Fish Resources

Indonesian marine fisheries sector currently have some serious problems, which are related to marine resources conservation, among others: (1) over exploitation; (2) usage of destructive fishing techniques; (3) physical habitat alteration and degradation, (4) pollution, (5) introduction of alien species; (6) conversion of protected areas into other development purposes; and (7) global climate change and natural disasters (Wisudo, 2012). Therefore, it is urgent to save the fish resources. Respondents efforts in sustainable utilization of fish resources are presented in Table 5.

Table 5. Respondents efforts in sustainable utilization of fish resources

No.	Sustainable Utilization of Fish Resources	Frequency	Percentage (%)
1	Fish resources is need to be thrifty or saved		
	a. Yes	0	0
	b. No	75	100
	Total	75	100
2	Using the destructive fihing gear		
	a. Yes	0	0
	b. No	75	100
	Total	75	100

As listed in Table 5, all respondents (100%) stated that fish resources do not need to be saved. This is due to their lack of understanding that fish resources are not "infinite". They consider fish resources in the ocean is a gift from God that should not be saved. This understanding need to be changed slowly. Respondents must understand that fish resources are limited though it can be renewable. So, respondents should save fish resources through catch only the mature fish. Moreover, the respondents realized that the number of fish declined from year to year, means that there must be a serious effort to save it.

In using fishing gear, all respondents (100%) said that they never use destructive fishing gear, such as a bomb or poison. This is consistent with the results of the study of Winata and Yuliana (2010), that the fishing gear used by fishermen around Palabuhanratu mostly are eco-friendly tools, among them are large mesh gillnet and long lines. Strict supervision from the authorities had an important role in this aspect.

According to them, respondents rarely catch fish around coral reefs. Respondents have understood that coral reefs should be well-conserved, should not be destroyed, as it has a high level of biodiversity. It's beauty, and bright color combination of organisms has attracted the attention of scientists. Coral reefs are one of the protected ecosystem, and is an indicator of the ecological sustainability component. Supangat (2006) mentioned that the framework of sustainable development means development to meet current needs without deteriorate the chance to meet future generations needs.

Based on findings in Table 5, level of sustainable fish resources utilization is determined, as presented in Table 6. The level of sustainable utilization is categorized high, as no respondents using destructive fishing gear.

Table 6. Level of sustainable fish resources utilization

Level	Indicators	Frequency	Percentage
Low (Score: 1-6)	Respondents don't understand that fish resources need to be saved; and using destructive fishing gear that is not environmental friendly	4	5.3
Medium (Score: 8-10)	Respondents don't understand that fish resources need to be saved, but still using destructive fishing gear	21	28.0
High (Score: 11-13)	Respondents don't understand that fish resources need to be saved and not using destructive fishing gear	50	66.7

All respondents efforts due to fish resources utilization are in line with three main aspects of fisheries sustainable development (Wisudo, 2012):

1. Ecological aspect, which considers that conservation of the wholeness of natural ecosystems is an essential condition to ensure the sustainability of the development of life.
2. Social aspect, which recognizes importance of democratization, empowerment, participation, transparency, and integrity of the culture as a key to implementing sustainable development.
3. Economics, i.e. the need to focus attention on increasing prosperity as much as possible within the constraints of capital availability and technological capability.

CONCLUSIONS

In the framework of fish resources conservation, the level of protection implemented by respondents are categorized medium. There are some efforts done by respondents to reduce catching only one certain species; did not catch protected fish species, and attempted to use fishing gear that only catch mature fish. Thus immature fish have a chance to grow until adult.

Level of respondents' understanding on fish resources conservation are categorized high. Respondents agree that fish resources need to be conserved for various reasons, among which are: to saving fish resources; continuation to catch fish; maintaining the beauty of the sea; and inter-generation sustainability of fish resources. Respondents also agreed that marine environment need to be maintained to support fish life.

The respondents' level of sustainable utilization is categorized high. Even though all the fishermen surveyed have not understood that the fish resources need to be saved, at the other hand they (100%) never use destructive fishing gear, such as a bomb or poison.

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